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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/538,529	06/10/2005	Giacomo Nicolao Maccalli	47966.14.1	6997
22850 7590 05/28/2008 INTELLECTUAL PROPERTY GROUP FREDRIKSON & BYRON, P.A. 200 SOUTH SIXTH STREET SUITE 4000 MINNEAPOLIS, MN 55402				
EXAMINER MACARTHUR, SYLVIA				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/538,529

**Applicant(s)**

MACCALLI ET AL.

**Examiner**

Sylvia R. MacArthur

**Art Unit**

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 January 2008.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3 and 5-23 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-3 and 5-23 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 10 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-85/08)  
Paper No(s)/Mail Date See Continuation Sheet  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_

Continuation of Attachment(s) 3. Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :4/15/2008;10/29/2007,10/23/2007.

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments with respect to claims 1-3 and 5-22 have been considered but are moot in view of the new ground(s) of rejection as necessitated by the amendment to claim 1 that the or at least a piece of side walls is an inert, refractory and electrically insulating material SiC or BN and further necessitated by the IDSs that were considered in preparation of this office action. Specifically, the use of Kordina et al (US 5,695,567) as a primary reference of prior art.

### ***Claim Objections***

2. Claims 17 and 18 are objected to because of the following informalities: In claim 17, line 1 applicant refers to a "tube", but the term should read - -susceptor system--. Claim 18 should depend from claim 16 and/or 17 which refers to structure (7)Appropriate correction is required.

### ***Double Patenting***

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned

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with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 1-3, 5-9, 11-15, and 18-22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 27-51 of copending Application No. 10/538,416 in view of Kordina et al (US 5,695,567). Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the co-pending application anticipate the claims of the present invention and fully encompass the invention.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Regarding claim 1: A susceptor system for an apparatus of the type adapted to treat substrates and/or wafers, the susceptor system being provided with a cavity (1) which acts as a chamber for the treatment of the substrates and/or wafers and which extends in a longitudinal direction and is delimited by an upper wall (2), by a lower wall (3), by a right-hand side wall (4), and by a left-hand side wall (5), the upper wall (2) being constituted by at least one piece of electrically conducting material suitable for being heated by electromagnetic induction, the lower wall (3) being constituted by at least one piece of electrically conducting material suitable for being heated by electromagnetic induction, the right-hand side wall (4) being constituted by at least one piece of inert, refractory and electrically insulating material, the left-hand side wall (5) being constituted by at least one piece of inert, refractory and electrically insulating material, so that

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the or each piece of the upper wall (2) is electrically insulated from the or each piece of the lower wall (3), the pieces (2, 3, 4, 5) being included in the susceptor system. See claims 27,34, and 35.

The co-pending application fails to teach that at least a piece or the side wall is constructed of SiC or BN.

Kordina et al teaches a susceptor made of four pieces, namely top, bottom and lateral (side) walls. The walls are recited as being made of graphite with a coating of SiC and thus comprise the material required by the claimed invention. The motivation to coat the walls with SiC is that the coating is a suitable material withstanding high temperature in order to prevent unwanted impurities from being incorporated in the layers of the SiC crystal growth, see col.1 lines 21-55. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the apparatus of the co-pending application by using sidewalls comprising SiC.

Regarding claim 2: A susceptor system according to claim 1 in which each of the walls (2, 3, 4, 5) is constituted by a single piece. The prior art of Kordina et al teaches a susceptor system made of four single pieces, namely a top wall, bottom wall, and two lateral (side walls), see the abstract and Fig.5 and 6 of Kordina et al. Kordina et al illustrates that it is conventional to manufacture the walls of a single piece as it simplifies the construction of the apparatus. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to construct the walls of a single piece.

Regarding claim 3: The teachings of the co-pending application were discussed above. The co-pending application fails to teach: a susceptor system according to claim 1 in which the

susceptor system or each piece of the side walls (4, 5) is made of silicon carbide or of boron nitride. Kordina et al teaches a susceptor device with an upper/bottom walls 13,14 and side walls 11 and 12. The abstract teaches the convention covering walls in such an apparatus with a SiC plate or coating see col. 1 lines 20-67, therein Kordina et al teaches it is conventional to use a SiC coating on the susceptor walls as the material is known to withstand high temperatures and will prevent unwanted impurities from being incorporation in the wafer treatment process. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the walls of apparatus with a coating of SiC as suggested by Kordina et al .

Regarding claim 5: A susceptor system according to claim 1 in which the external shape of the cross-section of the susceptor system is substantially uniform in the longitudinal direction and is substantially circular or elliptical. See claim 38.

Regarding claim 6: A susceptor system according to claim 1 in which the shape of the cross-section of the cavity (1) is substantially uniform in the longitudinal direction. Kordina et al illustrates in Figs. 5 and 6 that it is conventional to manufacture the cavity (1) is substantially uniform in the longitudinal direction as it simplifies the construction of the apparatus. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to construct the cavity (1) is substantially uniform in the longitudinal direction.

Regarding claim 7: A susceptor system according to claim 1 in which the average width of the cavity (1) is at least three times, more preferably at least five times, the average height of the cavity (1). See claim 43.

Regarding claim 8: A susceptor system according to claim 1 in which the pieces of the side walls (4, 5) have cross-sections of substantially rectangular or trapezoidal shape. See claim 39.

Regarding claim 9: A susceptor system according to claim 1 in which the piece of the upper wall (2) and/or the piece of the lower wall (3) have cross-sections having the external shape substantially of a segment of a circle or a segment of an ellipse. See claim 38.

Regarding claim 11: A susceptor system according to claim 1 in which the piece of the upper wall (2) and/or the piece of the lower wall (3) is hollow so as to have at least one hole (21, 31), preferably a through-hole, which extends in the longitudinal direction. See claim 46.

Regarding claim 12: A susceptor system according to claim 1 comprising a slide (6) mounted inside the cavity (1) and suitable for supporting at least one substrate or at least one wafer, the slide (6) being slidable in guided manner in the longitudinal direction. See claim 48.

Regarding claim 13: A susceptor system according to claim 12 in which the lower wall (3) has a guide (33) which is suitable for receiving the slide (6) and which extends in the longitudinal direction so that the slide (6) can slide along the guide (33).

Regarding claim 14: A susceptor system according to claim 12 in which the slide (6) comprises at least one disc (61) suitable for supporting at least one substrate or at least one wafer, and is provided with a recess (62) suitable for housing the disc (61) rotatably. See claim 49.

Regarding claim 15: Apparatus of the type adapted to treat substrates and/or wafers, characterized in that it comprises at least one susceptor system (2, 3, 4, 5) according to claim 1. See claim 27.



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Regarding claim 18: Apparatus according to claim 15 comprising a second, hermetic structure (8) suitable for surrounding the first structure (7). See claims 28 and 36. Hermetic is interpreted as a seal of protection.

Regarding claim 19: Apparatus according to claim 15 comprising electrical conduction means (9) which are suitable for heating the susceptor system by electromagnetic induction and which are wound around the first structure (7) or around the second structure (8). See claims 27,44, and 45.

Regarding claim 20: Apparatus according to claims 15 to 19, comprising means for causing at least one gas-flow to flow in at least one through-hole (21, 31) of the susceptor system. See claim 46.

Regarding claim 21: Apparatus according to any one of claim 15 characterized in that it is a reactor for the epitaxial growth of silicon carbide or similar material on substrates. This claim is interpreted as a matter of intended use and is not given patentable weight. See also claim 50.

Regarding claim 22: Apparatus according to claim 15 characterized in that it is an apparatus for the high-temperature thermal treatment of wafers. This claim is interpreted as a matter of intended use and is not given patentable weight. See also claim 51.

5. Claims 10, 16, 17, and 23 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 27-51 of copending Application No. 10/538,416 in view of Kordina et al ((US 5,694,567) in further view of Kaeppler et al (WO 02/38838) using US 7,048,802 as an English Translation.

The teachings of the co-pending application as modified Kordina et al were discussed above. The modification fails to teach:

Regarding claim 10: A susceptor system according to claim 1 in which the piece of the upper wall (2) and/or the piece of the lower wall (3) have grooves (22, 32) and/or ribs in the longitudinal direction for joining with the pieces of the side walls (4, 5). See Fig.2 and col. 2 lines 50-67 of the US 7,048,802 .The motivation to provide the grooves and or ribs of Kaeppler et al in the apparatus of the co-pending application according to the US 7,048,802 is that the radiation (heating) from the ceiling outer wall 4' does not pass directly to the quartz tube 6. This ensures better temperature control. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide slits and or ribs as suggested by Kaeppler et al.

Regarding claims 16 and 23: Apparatus according to claim 15, comprising a first refractory and thermally insulating structure (7) which surrounds the susceptor system (2, 3, 4, 5) and is constituted substantially by a tube of high-porosity graphite or similar material and which extends in the longitudinal direction. The foam sleeve according to the abstract of the WO publication is for improves heat insulation. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the high porosity graphite as a material of construction as suggested by the WO publication to Kaeppler et al.

Regarding claim 17: Apparatus according to claim 16 in which the tube is divided, in the longitudinal direction, into two half-tubes (71, 72) and the first structure (7) further comprises two elements (73) of refractory, thermally insulating and preferably electrically insulating

material which extend in the longitudinal direction and are disposed between the two half-tubes (71, 72). See claims 27, 33, and 42.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-3 ,6-9,11-13,15, 19, 21, and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Kordina et al (US 5,695,567).

Regarding claims 1-3:Kordina et al teaches a susceptor device with an upper/bottom walls 13,14 and side walls 11 and 12. The abstract teaches the convention covering walls in such an apparatus with a SiC plate or coating see col. 1 lines 20-67, therein Kordina et al teaches it is conventional to use a SiC coating on the susceptor walls as the material is known to withstand high temperatures and will prevent unwanted impurities from being incorporation in the wafer treatment process.

Regarding claims 5-9: See the Figures of Kordina et al.

Regarding claims 11 and 20: See the abstract wherein Kordina teaches a channel is formed to receive the substrate and through which a source material for the growth is to be fed, see also Fig.6.

Regarding claims 12-14: See discussion of recess and handling the transport of the wafer in col. 5 lines 9-31.

Regarding claims 15 and 22: This claim is interpreted as a matter of an intended use as the apparatus of Kordina et al is not structurally limited by the type of substrate processed therein. Nevertheless the apparatus of Kordina et al is inherently capable of processing the claimed substrate.

Regarding claim 19: See the paragraph that joins cols. 5 and 6 where heating means is by induction and is preferably a RF-radiating coil.

Regarding claim 21: The epitaxial growth of SiC is recited in col. 1 lines 5-20, though the claim is also interpreted as a matter of an intended use as the apparatus of Kordina et al is not structurally limited by the film grown in the reactor.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 10,16-18, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Quan et al in view of Kaeppler et al (WO 02/38838) using US 7,048,802 as an English Translation.

The teachings of the Kordina et al were discussed above. The application fails to teach:

Regarding claim 10: A susceptor system according to claim 1 in which the piece of the upper wall (2) and/or the piece of the lower wall (3) have grooves (22, 32) and/or ribs in the longitudinal direction for joining with the pieces of the side walls (4, 5).

Note Kordina et al does teaches in col.3 lines 1-29 that the individual wall pieces are screwed together by a mating between a screw, nut, and threaded recesses, but fails to teach grooves or ribs.

See Fig.2 and col. 2 lines 50-67 of the US 7,048,802 .The motivation to provide the grooves and or ribs of Kaeppler et al as an alternate way to secure the wall pieces is that it simplifies construction and ensures that the same material of construction is used to minimize the introduction of potential contaminants to the process. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide slits and or ribs to the apparatus of Kordina et al as suggested by Kaeppler et al.

Regarding claims 16 and 23: Apparatus according to claim 15, comprising a first refractory and thermally insulating structure (7) which surrounds the susceptor system (2, 3, 4, 5) and is constituted substantially by a tube of high-porosity graphite or similar material and which extends in the longitudinal direction. The foam sleeve according to the abstract of the WO publication is for improves heat insulation. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the high porosity graphite as a material of construction as suggested by the WO publication to Kaeppler et al to the apparatus of Kordina et al.

10. Claims 14 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kordina et al in view of Kaeppler et al (WO 02/38839).

The teachings of the Kordina et al were discussed above. The application fails to teach:

Regarding claim 14: A susceptor system according to claim 12 in which the slide (6) comprises at least one disc (61) suitable for supporting at least one substrate or at least one wafer, and is provided with a recess (62) suitable for housing the disc (61) rotatably.

Regarding claim 20: Apparatus according to claims 15 to 19, comprising means for causing at least one gas-flow to flow in at least one through-hole (21, 31) of the susceptor system.

Fig. 3 of the publication to Kaeppler et al teaches the conventionality of provide a recess and a disc in a susceptor. The combination of disc and recess is conventional as it provides for a gas curtain above, which the disc can rotate which enhances substrate support. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the disc and recess and illustrated by Kaeppler et al. Likewise, Kaeppler et al shows that it is conventional to provide such a through hole as a means to transport gas through the susceptor.

### *Conclusion*

11. Applicant's submission of an information disclosure statement under 37 CFR 1.97(c) with the fee set forth in 37 CFR 1.17(p) on 10/29/2007 and 10/23/2007 and the amendment of claim 1 and the introduction of new claim 23, necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 609.04(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-Th during the hours of 8 a.m. and 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

May 25, 2008

/Sylvia R MacArthur/  
Primary Examiner, Art Unit 1792